

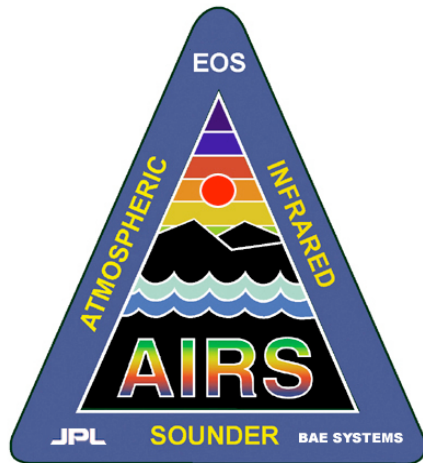
# AIRS/AMSU/HSB Version 4.0 Level 1B QA Quick Start

Edited by:  
Edward T. Olsen

Contributions by:

Hartmut Aumann, Steve Broberg,  
Steve Gaiser, Manju Kapoor

Jet Propulsion Laboratory, California Institute of Technology



March, 2005  
Version 1.0



Jet Propulsion Laboratory  
California Institute of Technology  
Pasadena, CA

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## Introduction

There are many Quality Assurance parameters that a user of may use to filter AIRS/AMSU/HSB data to create a subset for analysis. A complete description is provided in the file,

### **V4.0\_Release\_ProcFileDesc.pdf**

The novice user will find the plethora of QA parameters overwhelming, hence this document provides a quick start identification of the most basic QA parameters that a user should access before using any data for analysis.

The QA parameters may be static or dynamic. If dynamic, their timescale and scope can range from global to all channels to per footprint to a single channel in a footprint.

## Quick Start QA for AIRS L1B Data

### ***Static Per-Channel Quality Checks***

Some AIRS detector will have properties that will rule out their use for some purposes. The individual properties of each of the 2378 AIRS IR channels are summarized in a series of channel properties files keyed by effective start date.

The file names contain a date, identifying the first date for which they are valid (and supersede a channel properties file containing an earlier date). As of this release, there are five such files covering the time period from 5/04/02 to the present. Text versions are provided as ancillary files to this documentation:

<b>Channel Properties Files</b>
<b>L2.chan_prop.2002.08.30.v8.1.0.txt</b>
<b>L2.chan_prop.2002.09.17.v8.1.0.txt</b>
<b>L2.chan_prop.2002.10.22.v8.1.0.txt</b>
<b>L2.chan_prop.2003.01.10.v8.1.0.txt</b>
<b>L2.chan_prop.2003.11.19.v8.1.0.txt</b>

Beginning users of AIRS L1B radiances should select channels whose **AB\_State** (column 11 in channel properties file) is either 0, 1 or 2. **AB\_State** is a summary of channel radiometric quality, with higher values indicating lower quality. Radiances from AIRS channels with **AB\_State** > 2 should be avoided.

### ***Per-Granule-Per-Channel Quality Checks***

Do not use any data where the "**noise out of bounds**" bit in per-granule field "**CalChanSummary**" is set. This is bit 3, where bit 0 is the least significant bit (LSB).

### ***Per-Scan-Per-Channel Quality Checks***

The AIRS L1B product contains a per-scan field named "**CalFlag**". Users should avoid using any channel for any scan in which the "**offset problem**" or "**gain problem**", or "**pop detected**" bits are set (bits 6, 5, and 4 respectively where bit 0 is LSB). Additionally, bit 0, "**telemetry out of limit condition**", indicates conditions that can potentially impact data quality. Users who require pristine data should discard any data in which this bit is set.

### ***Per-Field-of-View Quality Checks***

Before using any AIRS L1B radiance, check the value of the corresponding "**state**" to ensure that it is equal to zero. There is one "**state**" value per field-of-view (FOV), and it is valid for all 2378 channels in that FOV. The "**state**" values and their meaning are:

<b>State Valid</b>	<b>State Value</b>	<b>Meaning</b>
Process	0	normal data
Special	1	instrument in special calibration mode when these data were taken (e.g., staring at nadir)
Erroneous	2	data known bad (e.g., instrument in safe mode)
Missing	3	data are missing

### ***Per-Channel Quality Checks***

Individual channel readings ("**radiances**") must be checked for the flag bad value of **-9999.0**. A channel reading is set to this value only when no radiance can be calculated; questionable or suspect values are indicated only by QA fields.

## Version 4.0 L1B QA Quick Start Documentation

Note that small negative radiances for shortwave channels (2000 to 2700  $\text{cm}^{-1}$ ) are rare, but valid. These negative radiances values are due to instrument noise, and occur when the scene temperatures drop below 190K, for example, over very high cloud or very cold surface.

### ***Spatial Co-registration***

Static estimates of detector co-registration are available in the Centroid and Cij columns of the channel properties files. We recommend that users whose research is sensitive to channel co-registration restrict channels used to those with Cij > 0.98. Alternatively, these user may choose to avoid using data from FOVs for which the “**SceneInhomogeneous**” flag is nonzero.

### ***Advanced Quality Checks***

Each scan contains a “**glintlat**” and “**glintlon**” giving the location of the solar glint center at the time in the middle of that scan. Users can use these or the per-field-of-view “**sun\_glint\_distance**” to check for possibility of solar glint contamination.

Infrared glints can occur over clouds as well as water and can extend up to several hundred km.

Note that there are two spectral SRF centroids listed: **nom\_freq** and **spectral\_freq**. Ignore **spectral\_freq** and **spectral\_freq\_unc** in version 4.0, These latter two fields are instantaneous estimates and therefore noisy. They should not be relied upon as QA indicators.

## Quick Start QA for VIS/NIR L1B Data

### *Per-Field-of-View Quality Checks*

Before using any VIS/NIR L1B radiance, check the value of the corresponding “**state**” to ensure that it is equal to zero. There is one “**state**” value per field-of-view (FOV), and it applies to all 8x9 pixels of all 4 channels in that FOV. The “**state**” values and their meaning are:

State Valid	State Value	Meaning
Process	0	normal data
Special	1	instrument in special calibration mode when these data were taken (e.g., staring at nadir)
Erroneous	2	data known bad (e.g., instrument in safe mode)
Missing	3	data are missing

### *Per-Channel Quality Checks*

Individual channel readings (“**radiances**”) must be checked for the flag bad value of **–9999.0**. A channel reading is set to this value by the PGE when no actual radiance value can be calculated.

### *Advanced Quality Checks*

Each scan contains a “**glintlat**” and “**glintlon**” giving the location of the solar glint center at the time in the middle of that scan. Users can use these or the per-field-of-view “**sun\_glint\_distance**” to check for possibility of solar glint contamination.

## Quick Start QA for AMSU-A L1B Data

### *Special Note for AMSU Channel 7*

AMSU channel 7 exhibits abnormal noise levels. Avoid using radiances from this channel unless averaging, smoothing or other noise reduction processing is part of your analysis. Please refer to the AMSU liens list in the Data Disclaimer documentation for details.

**V4.0\_Data\_Disclaimer.pdf**

### *Per-Scan Quality Checks*

Before using any AMSU-A1 or AMSU-A2 L1B brightness temperature, check the value of the corresponding “**state1**” or “**state2**” to ensure that it is equal to zero.

There is one “**state1**” value for all 30 fields-of-view of a scan, and it is valid for all AMSU-A1 channels (AMSU-A channels 3 through 15).

There is one “**state2**” value for all 30 fields-of-view of a scan, and it is valid for all AMSU-A2 channels (AMSU-A channels 1 and 2).

The “**state1**” and “**state2**” values and their meaning are:

State Valid	State Value	Meaning
Process	0	normal data
Special	1	instrument in special calibration mode when these data were taken (e.g., staring at nadir)
Erroneous	2	data known bad (e.g., instrument in safe mode)
Missing	3	data are missing

## ***Per-Channel Quality Checks***

Individual channel readings ("**antenna\_temp**" or "**brightness\_temp**") must be checked for the flag bad value of **-9999.0**. A channel reading is set to this value by the PGE when no actual antenna temperature value can be calculated.

Note that in V4.0 **antenna\_temp** is the same as **brightness\_temp**.

**brightness\_temp** is not side-lobe corrected in V4.0 and **brightness\_temp\_error** is therefore meaningless. Conversion from **antenna\_temp** to scene brightness temperature is done in Level 2.

## ***Advanced Quality Checks***

Each scan contains a "**glintlat**" and "**glintlon**" giving the location of the solar glint center at the time in the middle of that scan. Users can use these or the per-field-of-view "**sun\_glint\_distance**" to check for possibility of solar glint contamination.

Serious glint contamination of AMSU window channels (channels 1,2,3, and 15) is seen when the scene contains substantial water ( $\text{landFrac} < 0.5$ ) and "**sun\_glint\_distance**" is less than ~50km.

"**qa\_receiver\_a11**", "**qa\_receiver\_a12**", "**qa\_receiver\_a2**", bits 2-6 and "**qa\_channel**" bits 0-6 indicate conditions that can potentially, but not usually, impact data quality. Users who require pristine data should discard data when any of these bits are set.



## Quick Start QA for HSB L1B Data

### *Per-Scan Quality Checks*

Before using any HSB L1B brightness temperature, check the value of the corresponding “**state**” to ensure that it is equal to zero. There is one “**state**” value for all 90 fields-of-view of a scan, and it is valid for all 4 implemented channels. The “**state**” values and their meaning are:

State Valid	State Value	Meaning
Process	0	normal data
Special	1	instrument in special calibration mode when these data were taken (e.g., staring at nadir)
Erroneous	2	data known bad (e.g., instrument in safe mode)
Missing	3	data are missing

### *Per-Channel Quality Checks*

Individual channel readings (“**antenna\_temp**” or “**brightness\_temp**”) must be checked for the flag bad value of **–9999.0**. A channel reading is set to this value by the PGE when it becomes suspect during processing.

HSB Channel 1 was never implemented, so will always be –9999.0.

HSB data are unavailable after February 5, 2003 due to instrument failure.

### *Advanced Quality Checks*

Each scan contains a “**glintlat**” and “**glintlon**” giving the location of the solar glint center at the time in the middle of that scan. Users can use these or the per-field-of-view “**sun\_glint\_distance**” to check for possibility of solar glint contamination.

Some glint contamination is seen on HSB channel 2 when the scene contains substantial water (landFrac < 0.5) and “**sun\_glint\_distance**” is less than ~50km.

“**qa\_receiver**” bits 2-6 and “**qa\_channel**” bits 0-6 indicate conditions that can potentially, but not usually, impact data quality. Users who require pristine data should discard data when any of these bits are set.